Name:

at1117paper: Complete the Square (v326)

Example

A square's edge length is x feet. A rectangle has a height of x feet and a width of 38 feet. Their combined area, found by adding the square's area and the rectangle's area, is 600 square feet. What is the value of x?

Example's Solution

$$x^2 + 38x = 600$$

To complete the square, add $\left(\frac{38}{2}\right)^2 = 361$ to both sides.

$$x^2 + 38x + 361 = 961$$

Recognize the left side is now a perfect-square trinomial. Factor the left side.

$$(x + 19)^2 = 961$$

Undo the squaring.

$$x + 19 = \pm\sqrt{961}$$

$$x + 19 = \pm 31$$

Subtract 19 from both sides.

$$x = -19 \pm 31$$

In this geometric example, we are only concerned about the positive solution. So,

$$x = 12$$

Question 1

A square's edge length is x feet. A rectangle has a height of x feet and a width of 34 feet. The total area, of the square and rectangle, is 387 square feet. What is the value of x?

$$x^2 + 34x = 387$$

$$x^2 + 34x + 289 = 676$$

$$(x + 17)^2 = 676$$

$$x + 17 = \pm 26$$

$$x = 9$$

Question 2

A square's edge length is x feet. A rectangle has a height of x feet and a width of 44 feet. The total area, of the square and rectangle, is 1280 square feet. What is the value of x?

$$x^2 + 44x = 1280$$
$$x^2 + 44x + 484 = 1764$$
$$(x + 22)^2 = 1764$$
$$x + 22 = \pm 42$$
$$x = 20$$

Question 3

A square's edge length is x feet. A rectangle has a height of x feet and a width of 50 feet. The total area, of the square and rectangle, is 464 square feet. What is the value of x?

$$x^2 + 50x = 464$$
$$x^2 + 50x + 625 = 1089$$
$$(x + 25)^2 = 1089$$
$$x + 25 = \pm 33$$
$$x = 8$$